

WHAT IS CLAIMED IS

1 1. A data stream compression apparatus comprising
2
3 a data stream processing element for receiving a first stream of data entities at a
4 first line rate, each data entity including a data packet and a gap, and responsive to
5 a control signal for generating a second stream of data entities at a second line
6 rate which is less than the first line rate,
7
8 a control unit for providing said control signal identifying a predetermined portion
9 of non-unique, invariant content of said first stream of data entities, and
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11 wherein said data stream processing element in response to said control signal
12 removes said predetermined portion of non-unique, invariant content of said first
13 stream of data entities thereby generating said second data stream of data entities
14 at the second line rate.

1 2. The data stream compression apparatus of claim 1 wherein the non-
2 unique, invariant content of said first data stream is determined in real-time.

1 3. The data stream compression apparatus of claim 1 wherein the non-
2 unique, invariant content includes one or more interpacket characters.

1 4. The data stream compression apparatus of claim 1 wherein said first
2 data stream is gigabit Ethernet data stream and the non-unique, invariant content
3 includes one or more PREAMBLE characters.

1 5. The data stream compression apparatus of claim 1 wherein said first
2 data stream is gigabit Ethernet data stream and the non-unique, invariant content
3 includes one or more IDLE2 characters.

1 6. The data stream compression apparatus of claim 1 wherein said non-
2 unique, invariant content of said first stream of data entities has been
3 predetermined.

1 7. The data stream compression apparatus of claim 1 being part of a data
2 communication system including said data stream compression apparatus
3 connected to transmit said second data stream over a communication link to a data
4 stream expansion apparatus, said data stream expansion apparatus comprising
5
6 a data stream processing element for receiving said second data stream of data
7 entities from the communication link at a second line rate and responsive to a

8 control signal for generating a first stream of data entities at a first line rate which
9 is greater than the second line rate,
10
11 a control unit for providing said control signal identifying a predetermined portion
12 of non-unique, invariant content which is to be added to said second data stream
13 of data entities, and
14
15 wherein said data stream processing element in response to said control signal
16 adds said predetermined portion of non-unique, invariant content to said second
17 data stream of data entities thereby generating said first data stream of data
18 entities at the first line rate.

1 8. A data stream expansion apparatus comprising

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3 a data stream processing element for receiving a second data stream of data
4 entities at a second line rate and responsive to a control signal for generating a
5 first stream of data entities at a first line rate which is greater than the second line
6 rate,
7
8 a control unit for providing said control signal identifying a predetermined portion
9 of non-unique, invariant content which is to be added to said second data stream
10 of data entities, and

11

12 wherein said data stream processing element in response to said control signal
13 adds said predetermined portion of non-unique, invariant content to said second
14 data stream of data entities thereby generating said first data stream of data
15 entities at the first line rate.

1 9. The data stream compression apparatus of claim 8 wherein the non-
2 unique, invariant content of said first data stream is determined in real-time.

1 10. The data stream compression apparatus of claim 8 wherein the non-
2 unique, invariant content includes one or more interpacket characters.

1 11. The data stream compression apparatus of claim 8 wherein said first
2 data stream is gigabit Ethernet data stream and the non-unique, invariant content
3 includes one or more PREAMBLE characters.

1 12. The data stream compression apparatus of claim 8 wherein said first
2 data stream is gigabit Ethernet data stream and the non-unique, invariant content
3 includes one or more IDLE2 characters.

1 13. The data stream compression apparatus of claim 8 wherein said non-
2 unique, invariant content of said first stream of data entities has been
3 predetermined.

1 14. A data compression multiplexer apparatus comprising
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3 (1) a plurality of data stream compression apparatuses, each comprising
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5 a data stream processing element for receiving a first data stream of data
6 entities at a first line rate, each data entity including a data packet and a gap, and
7 responsive to a control signal for generating a second stream of data entities at a
8 second line rate which is less than the first line rate,
9

10 a control unit for providing said control signal identifying a predetermined
11 portion of non-unique, invariant content of said first stream of data entities, and
12

13 wherein said data stream processing element in response to said control
14 signal removes said predetermined portion of non-unique, invariant content of
15 said first stream of data entities thereby generating said second data stream of data
16 entities at the second line rate, and
17

18 (2) a data stream multiplexer for multiplexing said plurality of second data
19 streams to generate a multiplexed data stream.

1 15. The data compression multiplexer apparatus of claim 14 including
2 eight data stream compression apparatuses,
3 wherein each said first data stream is a gigabit Ethernet data stream at 1.25
4 Gb/s, and
5 wherein said multiplexed data stream generated by said data stream
6 multiplexer is less than or equal to the SONET OC-192 line rate.

1 16. The data compression multiplexer apparatus of claim 14 being part of
2 a data communication system including said data compression multiplexer
3 apparatus connected to transmit said multiplexed data stream over a
4 communication link to a data expansion demultiplexer apparatus, the data
5 expansion demultiplexer apparatus comprising
6
7 (1) a data stream demultiplexer for demultiplexing a received multiplexed data
8 stream from the communication link into a plurality of second data streams and
9
10 (2) a plurality of data stream expander apparatuses, each for processing one of the
11 plurality of second data streams, each data stream expander apparatus including
12

13 a data stream processing element for receiving a second data stream of
14 data entities at a second line rate and responsive to a control signal for generating
15 a first stream of data entities at a first line rate which is greater than the second
16 line rate,

17

18 a control unit for providing said control signal identifying a predetermined
19 portion of non-unique, invariant content which is to be added to said second data
20 stream of data entities, and

21

22 wherein said data stream processing element in response to said control
23 signal adds said predetermined portion of non-unique, invariant content to said
24 second data stream of data entities thereby generating said first data stream of
25 data entities at the first line rate.

1 17. A data expansion demultiplexer apparatus comprising

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3 (1) a data stream demultiplexer for demultiplexing a received multiplexed data
4 stream into a plurality of second data streams and

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6 (2) a plurality of data stream expander apparatuses, each for processing one of the
7 plurality of second data streams, each data stream expander apparatus including

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9 a data stream processing element for receiving a second data stream of
10 data entities at a second line rate and responsive to a control signal for generating
11 a first stream of data entities at a first line rate which is greater than the second
12 line rate,

13

14 a control unit for providing said control signal identifying a predetermined
15 portion of non-unique, invariant content which is to be added to said second data
16 stream of data entities, and

17

18 wherein said data stream processing element in response to said control
19 signal adds said predetermined portion of non-unique, invariant content to said
20 second data stream of data entities thereby generating said first data stream of
21 data entities at the first line rate.

1 18. The data expansion demultiplexer apparatus of claim 17 including
2 eight data stream expansion apparatuses,

3 wherein the data rate of the received multiplexed data stream is less than
4 or equal to the SONET OC-192 line rate, and

5 wherein at least one of the data stream expansion apparatuses receives a
6 second data stream from the data stream demultiplexer and generates therefrom a
7 gigabit Ethernet data stream at 1.25 Gb/s.

1 19. A method of operating a data stream compression apparatus
2 comprising the steps of:
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4 receiving a first stream of data entities at a first line rate, each data entity
5 including a data packet and a gap,
6
7 identifying a predetermined portion of non-unique, invariant content of said first
8 stream of data entities, and
9
10 removing said predetermined portion of non-unique, invariant content of said first
11 stream of data entities thereby generating said second data stream of data entities
12 at the second line rate.

1 20. A method of operating a data stream expansion apparatus comprising
2 the steps of:
3
4 receiving a second data stream of data entities at a second line rate,
5
6 identifying a predetermined portion of non-unique, invariant content which is to
7 be added to said second data stream of data entities, and
8

- 9 adding said predetermined portion of non-unique, invariant content to said second
- 10 data stream of data entities thereby generating said first data stream of data
- 11 entities at the first line rate.